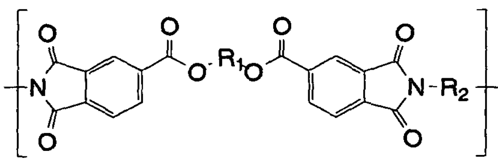
CLAIMS

1. A laminate having a layer construction of first inorganic material layer/insulating layer/second inorganic material layer or a layer construction of inorganic material layer/insulating layer,

said insulating layer having a multi-layer structure of two or more resin layers,

at least one of the layers constituting the insulating layer being formed of a polyimide resin which comprises repeating units represented by formula (1) and has a glass transition point of 150 to 360°C and is dissolvable in a basic solution at a rate of more than 3 μm/min:



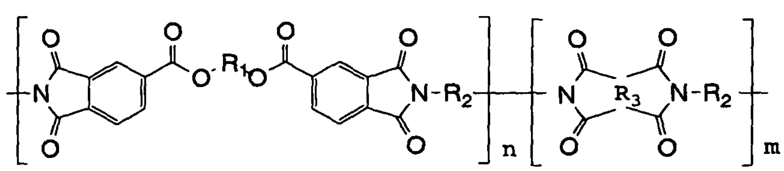
(1)

wherein R_1 and R_2 each represent a divalent organic group and may have a single structure or a combination of two or more structures; and n is an integer of two or more.

2. A laminate having a layer construction of first inorganic material layer/insulating layer/second inorganic material layer or a layer construction of inorganic material layer/insulating layer,

said insulating layer having a multi-layer structure of two or more resin layers,

at least one layer constituting the insulating layer being formed of a polyimide resin which comprises repeating units represented by formula (2) and has a glass transition point of 150 to 360°C and is dissolvable in a basic solution at a rate of more than 3 μm/min:



(2)

wherein R_1 and R_2 each represent a divalent organic group and may have a single structure or a combination of two or more structures;

R_3 represents at least one acid dianhydride selected from the group consisting of diphenylsulfone-2,3,3′,4′-tetracarboxylic acid dianhydride, diphenylsulfone-2,2′,3,3′-tetracarboxylic acid dianhydride, pyromellitic acid dianhydride, benzophenonetetracarboxylic acid dianhydride, 2,3,3′,4′-biphenyltetracarboxylic acid dianhydride, 3,3′,4,4′-biphenyltetracarboxylic acid dianhydride, 2,3,3′,4′-diphenyl ether tetracarboxylic acid dianhydride, 2,3,3′,4,4′-diphenyl ether tetracarboxylic acid dianhydride, and 1,4,5,8-naphthalenetetracarboxylic acid dianhydride; and n and m are an integer of two or more.

3. The laminate according to claim 1 or 2, wherein not less than 50% in terms of molar fraction of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3):

$$-\left(CH_2\right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15.

4. The laminate according to claim 1 or 2, wherein 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3):

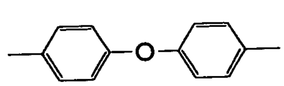
$$-\left(CH_2\right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15.

5. The laminate according to claim 1 or 2, wherein 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3) and not less than 30% in terms of molar fraction of the divalent organic group contained in R_2 is accounted for by a divalent organic group represented by formula (4):

$$-\left(CH_2\right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15; and



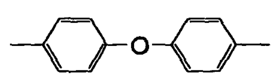
(4)

6. The laminate according to claim 1 or 2, wherein 100%

of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3) and not less than 80% in terms of molar fraction of the divalent organic group contained in R_2 is accounted for by a divalent organic group represented by formula (4):

$$\left(CH_2 \right)_n \quad (3)$$

wherein n is an integer of 1 to 15; and



(4)

7. The laminate according to any one of claims 1 to 6, wherein at least one of the resin layers constituting the insulating layer is formed of a low expansion resin having a coefficient of expansion of 0 to 40 ppm.

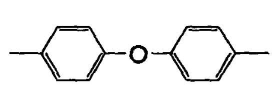
8. The laminate according to any one of claims 1 to 6, wherein all the resin layers constituting the insulating layer are formed of the polyimide resin.

9. The laminate according to any one of claims 1 to 8, wherein the insulating layer, which forms an interface with at least one of the inorganic material layers, is formed of a polyimide resin,

said polyimide resin being such that 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3) and not less than 80% in terms of molar fraction of the divalent organic group contained in R_2 is accounted for by a divalent organic group represented by formula (4):

$$\left(CH_2 \right)_n \quad (3)$$

wherein n is an integer of 1 to 15; and



(4)

10. The laminate according to any one of claims 1 to 8, wherein

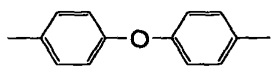
said insulating layer has a laminate structure of first insulating layer/second insulating layer/third insulating layer, the first insulating layer and the third insulating layer are

formed of a polyimide resin such that 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3) and not less than 80% in terms of molar fraction of the divalent organic group contained in R_2 is accounted for by a divalent organic group represented by formula (4), and

the second insulating layer is formed of a low expansion resin having a coefficient of expansion of 0 to 40 ppm:

$$-\left(CH_2 \right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15; and



(4)

11. The laminate according to any one of claims 1 to 10, wherein the inorganic material layers are such that both the inorganic material layers are formed of copper alloy, both the inorganic material layers are formed of copper, one of the inorganic material layers is formed of copper with the other inorganic material layer being formed of copper alloy, or one of the inorganic material layers is formed of copper or copper alloy with the other inorganic material layer is formed of stainless steel.

12. An electronic circuit component produced by etching the laminate according to any one of claims 1 to 11.

13. A suspension for a hard disk drive, produced by etching the laminate according to any one of claims 1 to 11.

14. An electronic circuit component produced by removing the insulating layer in the laminate according to any one of claims 1 to 11 by a wet process to form a desired shape.

15. A suspension for a hard disk drive, produced by removing the insulating layer in the laminate according to any one of claims 1 to 11 by a wet process to form a desired shape.

16. An electronic circuit component produced by removing the insulating layer in the laminate according to any one of claims 1 to 11 with a basic solution to form a desired shape.

17. A suspension for a hard disk drive, produced by removing the insulating layer in the laminate according to any one of claims

1 to 11 with a basic solution to form a desired shape.

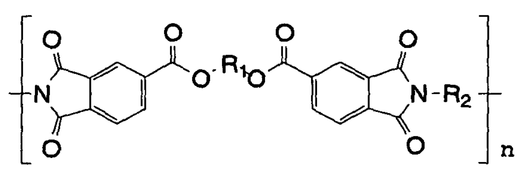
18. An electronic circuit component produced by removing the insulating layer in the laminate according to any one of claims 1 to 11 with an alkali-amine solution to form a desired shape.

19. A suspension for a hard disk drive, produced by removing the insulating layer in the laminate according to any one of claims 1 to 11 with an alkali-amine solution to form a desired shape.

20. An electronic circuit component produced by removing the insulating layer in the laminate according to any one of claims 1 to 11 by a wet process to form a desired shape, an inorganic nitride layer and/or an inorganic fluoride layer being absent on the surface of the inorganic material layer exposed by the removal of the insulating layer.

21. A suspension for a hard disk drive, produced by removing the insulating layer in the laminate according to any one of claims 1 to 11 by a wet process to form a desired shape, an inorganic nitride layer and/or an inorganic fluoride layer being absent on the surface of the inorganic material layer exposed by the removal of the insulating layer.

22. An insulating film comprising an insulating layer having a multi-layer structure of two or more resin layers, at least one of the resin layers constituting the insulating layer being formed of a polyimide resin which has a structure comprising repeating units represented by formula (1) and has a glass transition point of 150 to 360°C and is dissolvable in a basic solution at a rate of more than 3 μm/min:

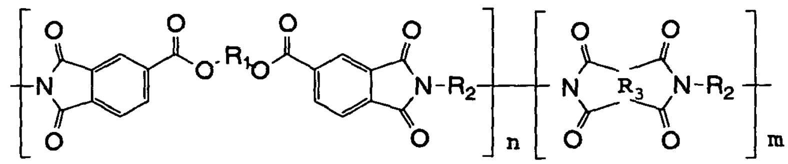


(1)

wherein R_1 and R_2 each represent a divalent organic group and may have a single structure or a combination of two or more structures; and n is an integer of two or more.

23. An insulating film comprising an insulating layer having a multi-layer structure of two or more resin layers, at least one of the resin layers constituting the insulating layer being formed of a polyimide resin which has a structure comprising

repeating units represented by formula (2) and has a glass transition point of 150 to 360°C and is dissolvable in a basic solution at a rate of more than 3 μm/min:



(2)

wherein R_1 and R_2 each represent a divalent organic group and may have a single structure or a combination of two or more structures; R_3 represents at least one acid dianhydride selected from the group consisting of diphenylsulfone-2,3,3′,4′-tetracarboxylic acid dianhydride, diphenylsulfone-2,2′,3,3′-tetracarboxylic acid dianhydride, pyromellitic acid dianhydride, benzophenonetetracarboxylic acid dianhydride, 2,3,3′,4′-biphenyltetracarboxylic acid dianhydride, 3,3′,4,4′-biphenyltetracarboxylic acid dianhydride, 2,3,3′,4′-diphenyl ether tetracarboxylic acid dianhydride, 2,3,3′,4,4′-diphenyl ether tetracarboxylic acid dianhydride, and 1,4,5,8-naphthalenetetracarboxylic acid dianhydride; and n and m are an integer of two or more.

24. The insulating film according to claim 22 or 23, wherein the polyimide resin is an adhesive polyimide having a structure such that not less than 50% in terms of molar fraction of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3):

$$-\!\left(CH_2 \right)_n\!- \qquad (3)$$

wherein n is an integer of 1 to 15.

25. The insulating film according to claim 22 or 23, wherein the polyimide resin is an adhesive polyimide having a structure such that 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3):

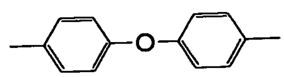
$$-\!\left(CH_2 \right)_n\!- \qquad (3)$$

wherein n is an integer of 1 to 15.

26. The insulating film according to claim 22 or 23, wherein the polyimide resin is an adhesive polyimide having a structure such that 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3) and not less than 30% in terms of molar fraction of the divalent organic group contained in R_2 is accounted for by a divalent organic group represented by formula (4):

$$-\left(CH_2\right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15; and

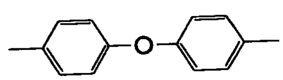


(4)

27. The insulating film according to claim 22 or 23, wherein the polyimide resin is an adhesive polyimide having a structure such that 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3) and not less than 80% in terms of molar fraction of the divalent organic group contained in R_2 is accounted for by a divalent organic group represented by formula (4):

$$-\left(CH_2\right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15; and



(4)

28. The insulating film according to any one of claims 22 to 27, wherein at least one of the resin layers constituting the insulating layer is formed of a polyimide resin having a coefficient of expansion of 0 to 40 ppm.

29. The insulating film according to any one of claims 22 to 27, wherein all the resin layers constituting the insulating layer are formed of the polyimide resin.

30. The insulating film according to any one of claims 22 to 27, wherein, in each of front surface and backside surface insulating layers, the polyimide resin is an adhesive polyimide resin such that 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3):

$$-\left(CH_2 \right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15.

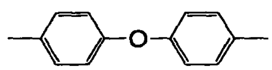
31. The insulating film according to any one of claims 22 to 27, wherein

said insulating layer has a laminate structure of a first insulating layer and a second insulating layer,

the first insulating layer and the second insulating layer are formed of a polyimide resin such that 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3) and not less than 80% in terms of molar fraction of the divalent organic group contained in R_2 is accounted for by a divalent organic group represented by formula (4):

$$-\left(CH_2 \right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15; and



(4)

32. The insulating film according to any one of claims 22 to 27, wherein

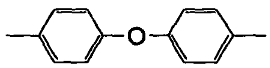
said insulating layer has a laminate structure of first insulating layer/second insulating layer/third insulating layer,

the first insulating layer and the third insulating layer are formed of a polyimide resin having a structure such that 100% of the divalent organic group contained in R_1 in formula (1) or (2) is accounted for by a divalent organic group represented by formula (3) and not less than 80% in terms of molar fraction of the divalent organic group contained in R_2 is accounted for by a divalent organic group represented by formula (4), and

the second insulating layer is formed of a low expansion polyimide resin having a coefficient of expansion of 0 to 40 ppm:

$$-\left(CH_2 \right)_n- \qquad (3)$$

wherein n is an integer of 1 to 15; and

 (4)

33. A laminate comprising an inorganic material layer and, stacked on the inorganic material layer, the insulating film according to any one of claims 22 to 32.

34. An electronic circuit component produced by etching the insulating film according to any one of claims 22 to 32.

35. A suspension for a hard disk drive, produced by etching the insulating film according to any one of claims 22 to 32.

36. An electronic circuit component produced by removing the insulating film according to any one of claims 22 to 32 by a wet process to form a desired shape.

37. A suspension for a hard disk drive, produced by removing the insulating film according to any one of claims 22 to 32 by a wet process to form a desired shape.

38. An electronic circuit component produced by removing the insulating film according to any one of claims 22 to 32 with a basic solution to form a desired shape.

39. A suspension for a hard disk drive, produced by removing the insulating film according to any one of claims 22 to 32 with a basic solution to form a desired shape.

40. An electronic circuit component produced by removing the insulating film according to any one of claims 22 to 32 with an alkali-amine solution to form a desired shape.

41. A suspension for a hard disk drive, produced by removing the insulating film according to any one of claims 22 to 32 with an alkali-amine solution to form a desired shape.

42. A laminate having a layer construction of first inorganic material layer/insulating layer/second inorganic material layer or a layer construction of inorganic material layer/insulating layer,

said insulating layer having a multi-layer structure of two or more resin layers,

the ratio of the etching rate of the resin layer having a higher etching rate to the etching rate of the resin layer having a lower etching rate being in the range of 6 : 1 to 1 : 1.

43. The laminate according to claim 42, wherein the ratio

of the etching rate of the resin layer having a higher etching rate to the etching rate of the resin layer having a lower etching rate is in the range of 4 : 1 to 1 : 1.

44. The laminate according to claim 42 or 43, wherein the insulating layer comprises a core insulating layer and an adhesive layer provided on both sides of the core insulating layer.

45. The laminate according to claim 44, wherein the strength of bonding of the adhesive layer to the inorganic material layer and the core insulating layer is at least 300 g/cm.

46. The laminate according to claim 44, wherein the thickness ratio of the core insulating layer to each of the adhesive layers is up to 4 : 1.

47. The laminate according to claim 42 or 43, wherein at least one of the layers constituting the insulating layer is formed of a polyimide resin.

48. The laminate according to claim 42 or 43, wherein all the layers constituting the insulating layer are formed of a polyimide resin.

49. The laminate according to claim 42 or 43, wherein the etching rate ratio in the insulating layer is a value as measured in etching with an alkali solution.

50. The laminate according to claim 42 or 43, wherein the inorganic material constituting the laminate is selected from copper, alloy copper, and stainless steel.

51. An electronic circuit component produced by etching the laminate according to claim 42 or 43.

52. An electronic circuit component produced by etching the laminate according to claim 42 or 43 by a wet process.

53. An electronic circuit component produced by etching the laminate according to claim 42 or 43 by a wet process, an inorganic nitride layer and/or an inorganic fluoride layer being absent on the surface of the inorganic material layer exposed by the removal in the etching.

54. A suspension for a hard disk drive, produced by etching the laminate according to claim 42 or 43 by a wet process, an inorganic nitride layer and/or an inorganic fluoride layer being absent on the surface of the inorganic material layer exposed

by the removal in the etching.

55. An insulating film comprising two or more resin layers, the ratio of the etching rate of the resin layer having a higher etching rate to the etching rate of the resin layer having a lower etching rate being in the range of 6 : 1 to 1 : 1.

56. The insulating film according to claim 55, wherein the ratio of the etching rate of the resin layer having a higher etching rate to the etching rate of the resin layer having a lower etching rate is in the range of 4 : 1 to 1 : 1.

57. The insulating film according to claim 55, wherein at least one of the resin layers is formed of a polyimide resin.

58. The insulating film according to claim 55, wherein all the resin layers constituting the insulating layer are formed of a polyimide resin.

59. A laminate comprising the insulating film according to claim 55 and an inorganic material stacked on top of each other.

60. An electronic circuit component produced by etching the laminate comprising the insulating film according to claim 55 and an inorganic material stacked on top of each other.

61. An electronic circuit component produced by etching the laminate comprising the insulating film according to claim 55 and an inorganic material stacked on top of each other by a wet process.

62. An electronic circuit component produced by etching the laminate comprising the insulating film according to claim 55 and an inorganic material stacked on top of each other by a wet process, an inorganic nitride layer and/or an inorganic fluoride layer being absent on the surface of the inorganic material layer exposed by the etching.

63. A suspension for a hard disk drive, produced by etching the laminate comprising the insulating film according to claim 55 and an inorganic material stacked on top of each other by a wet process, an inorganic nitride layer and/or an inorganic fluoride layer being absent on the surface of the inorganic material layer exposed by the etching.